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TO STUDY THE CORRELATION OF BIPARIETAL DIAMETER, HEAD CIRCUMFERENCE & FEMUR LENGTH ON USG WITH GESTATIONAL AGE ASSESSED CLINICALLY BY NAEGLE'S RULE.

Radiodiagnosis

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ABSTRACT

BACKGROUND: In detecting fetal abnormalities & intrauterine growth retardation, the ultrasound measurement of fetal dimensions is very helpful. Even in women with reliable dates, the error in gestational age(GA) calculation can occur, thus accurate assessment of GA by sonography is of great importance. For diagnosis, investigation & treatment of fetus in vitro estimation of GA by ultrasonography is of high clinical importance.
AIMS: To find out the least variable parameter for estimation of fetal gestational age & to see whether a single parameter can be applied over whole pregnancy period to avoid the confusion in interpretation of gestational age.
MATERIALS & METHODS: The present hospital based observational study was conducted at government tertiary hospital of Jammu. All the participants were explained purpose of study & informed consent was taken from every participant prior to study. After meeting inclusion & exclusion criteria all the patients underwent complete history, examination & ultrasonography.
RESULTS: Among 200 participants maximum number of participants i.e. 95 were seen in age group of 23-26yrs followed by 53 in 27-30yrs. A total of 69 participants had weight 61-65kgs whereas height of 155-158cms was found in 116 participants. Maximum no.of cases closest to Naegle's rule were estimated by biparietal diameter (146) followed by femur length but femur length showed least deviation from Naegle's rule.
CONCLUSION: From the present study it has been concluded that both femur length & bi-parietal diameter are equally efficient estimators of fetal gestational age but femur length showed a slight edge over BPD in normal overall pregnancy.

KEYWORDS

Biparietal diameter, Femur length, Pregnancy, Ultrasound.

INTRODUCTION:
An ultrasound is very helpful in detecting fetal abnormalities and intrauterine growth retardation (IUGR) by measurement of fetal biometry such as biparietal diameter (BPD), head circumference (HC), abdominal circumference (AC) and femur length (FL). Many studies have established normal charts or curves of fetal biometry.[1] Measurements in ultrasound studies are taken by identifying standardized anatomical landmarks, then at predefined points calipers are placed & fetal biometric measurements taken & plotted on graphs against expected values for gestational age. To ensure consistency of measurements different strategies have been used. One strategy is to employ only one sonographer[2] while other studies utilize a number of trained, experienced sonographers.[3-4] There is a need to take the measurements in a methodologically consistent manner when evaluating fetal biometry using ultrasound, both in research studies and in clinical practice.[5] For pregnancy management from the first trimester to delivery, the accurate dating of pregnancy is critically important & for determining viability in premature labour & in post-dated deliveries, it is particularly necessary.[6] Ultrasound when performed with quality & precision, it is the best method for estimating the delivery date & is more accurate than a "certain" menstrual date for determining gestational age in the first and second trimesters in spontaneous conceptions.[7-8] The aim of this research was to find out the least variable parameter for estimation of fetal gestational age & to see whether a single parameter can be applied over whole pregnancy period to avoid the confusion in interpretation of gestational age.

MATERIAL AND METHOD:
The present hospital based observational study was conducted at government tertiary hospital of Jammu. All the participants were explained purpose of study & informed consent was taken from every participant prior to study. All the participants were subjected to inclusion & exclusion criteria.

Inclusion criteria:
Age≤ 40years. Females with no significant medical history in the past, should be educated enough to know certain things like her LMP & knows certain pregnancy details, have no existing obstetrical complication that is likely to affect the outcome of the study and fetus should be normal, should have singleton pregnancy with no documented or known fetal abnormality.

Exclusion criteria:
Subjects not willing to participate in study.

All the participants underwent complete history, examination & ultrasonography.

Statistical Analysis:
Analysis of data was done using statistical software MS Excel / SPSS version 17.0 for windows. Data presented as percentage (%) as discussed appropriate for quantitative and qualitative variables.

OBSERVATION & RESULTS:
Gestational age of the 200 fetuses were calculated by 'Naegle's Rule'.

Table No. 1 shows that out of total 200 participants maximum number of participants i.e. 95 were seen in age group of 23-26yrs followed by 53 in 27-30yrs. A total of 69 participants had weight 61-65kgs whereas height of 155-158cms was found in 116 participants.

Table No. 2 shows comparison of all the three parameters (FL,BPD,HC) & it has been seen that maximum no. of cases closest to Naegle's rule are estimated by biparietal diameter followed by femur length but femur length shows least deviation from Naegle's rule when compared upto 3 weeks.

DISCUSSION:
Routine measurement of biparietal diameter, head circumference, abdominal circumference & femur length to estimate gestational age in an outpatient setting is done by ultrasound.[9] Dating a pregnancy using ultrasound measurements is clinically superior than menstrual dating with or without ultrasound, when ultrasound is performed with quality. Gestational age estimation by ultrasound in the first trimester is more accurate than later in pregnancy, ultrasound alone is the best method for estimating the delivery date & is more accurate than a certain menstrual date for determining gestational age especially in the first and second trimesters.[10]

In the present study, out of total 200 participants maximum number of participants i.e. 95 were seen in age group of 23-26yrs followed by 53 in 27-30yrs. Maximum participants i.e.69 had weight 61-65kgs & height of 155-158cms was found in 116 participants.

In the present study it has been seen that both biparietal diameter & femur length ultrasound measurement are better than head circumference ultrasound measurement for estimation of gestational age when compared over whole pregnancy period. The femur length seems to be just having an edge over BPD when talking of deviation upto 21 days. Thus both are equal estimators of GA in full normal pregnancy. Falatah HA et al in a study showed that 15.38% of patients don't have any week difference between biparietal diameter ultrasound measurement and last menstrual period calculation while 84.61% of pregnant women have variable difference by weeks in gestational age between ultrasound measurements and last menstrual period calculation. This variability could be due to the wrong date of last menstrual period given to sonographer by patient or no previous scan of patient was done in the first or second trimester. Femur length varies somewhat with ethnicity. Short femurs are commonly a normal variant but this finding may indicate fetal growth restriction, aneuploidy & severely shortened skeletal dysplasias.[10] Jaiswal P et al in a study showed that GA assessment by ultrasonography can be of immense value as in our country most of the women may not keep menstrual record properly. To determine EDD & to predict GA, BPD is one of the useful criteria but the fetal anthropometric measurements significantly differ among different population group due to racial, genetic and ethnic factors. By properly estimating GA and growth using serial ultrasonography of fetus the perinatal mortality and morbidity can be reduced.[11]

CONCLUSION:

From the present study it has been concluded that both femur length & bi-parietal diameter are equally efficient estimators of fetal gestational age but femur length showed a slight edge over BPD in normal overall pregnancy. Thus, femur length is clearly a better choice on comparison to bi-parietal diameter & head circumference.

Recommendations:

Fetuses with asymmetrical growth retardation where femur length can't be estimated properly, bi-parietal diameter & head circumference surely the better choices. Therefore, further studies are needed to be carried out in fetuses with growth retardation , other developmental delays & abnormalities so that gestational age can be properly estimated in them too.

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Declaration:

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Conflict of interest: None declared

Table no. 1 Personal characteristics of participants:

	Number of participants
Age (in years)	
18-22	12
23-26	95
27-30	53
31-35	33
≥35	7
Weight(in kgs)	
50-55	3
56-60	24
61-65	69
66-70	52
71-75	44
≥76	8
Height(in cms)	
150-154	11
155-158	116
159-162	57
163-166	15
167-170	1

Table No 2. Shows variations in GA as estimated by LMP when compared to sonographically derived GA by BPD, FL & HC.

Accuracy range in weeks	Number of participants		
	FL	BPD	HC
0-2	141	146	126
2.1-3	32	20	16
3.1-4	12	17	52
4.1-6	15	16	4
≥6.1	0	1	2
Total	200	200	200

LMP-Last Menstrual Period, GA-Gestational Age, BPD-Biparietal Diameter, FL-Femur Length , HC-Head Circumference.

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